M/045/017

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August 13, 1992

Mr. Glen Eurick
Environmental Affairs Coordinator
Barrick Mercur Gold Mine
P.O. Box 838
Tooele, Utah 84074

RE: Dump Leach No. 3, Location of New Well, MW-19; *Conditional Approval*: Ground Water Discharge Permit No. UGW450001.

Dear Mr. Eurick:

We have reviewed your July 13, 1992 response wherein, you proposed that the new monitoring well be placed on the east side of Dump Leach No. 3. Subsequently, during a meeting of August 4, 1992, Barrick explained why an eastern location was preferred, as located between existing wells MW-10 and MW-13, and as summarized below:

1. Proximity and Time of Travel - the eastern site proposed is in closer proximity to the dump's process pool than the northeastern site requested by DWQ on June 15, 1992. This proximity may allow for more rapid detection of a contaminant release from the facility.

2. Distribution of Joint Orientation - though the point maxima of the more permeable joint set D1 would suggest a northeasterly location would be preferred, the stereonet diagrams submitted indicate a wide range of scatter of joint orientation. In other words, the D1 joint set has about a 70° range of strike from North 10° East to North 80° East, while the D2 joint set has about a 50° range of scatter from about North 70° West to North 20° West (see February, 1991 "Results of Joint and Fracture Characterization Study", Plate 10). As a result, it may not be appropriate to assume that a contaminant fluid would travel only in the direction of the point maxima, but may travel along several joint orientations.

3. Intersection of Joint Sets - a plot of the joint set intersections suggests that the intersections are somewhat vertical (average plunge = 69.8°, average strike = south 64.6°

east; July 13, 1992 letter, Figure 2). Furthermore, due to the influence of gravity the contaminant fluid should travel primarily vertically in the vadose zone. In the saturated zone these intersections may make the contaminant path very tortuous, causing contaminant travel along one joint set and then another during the course of its movement. This would enhance the mechanical dispersion that a contaminant would undergo and spread out or widen a contaminant plume. Thus possibly making it more likely to detect contamination with a fewer number of wells.

4. Apparent Hydraulic Connection - the earlier pump test conducted in MW-10 showed a possible hydraulic connection between it and well MW-13. Though not conclusive, this may indicate that this portion of the aquifer behaves more like a Darcy continuum than other areas, and hence may make a better location for ground water monitoring.

5. Joint Set Permeability Contrast - the 2-fold contrast in hydraulic conductivity between joint sets D1 and D2 does not suggest that one joint set would conduct the contaminant alone at the exclusion of the other fracture set. Such would be the case if the contrast were on the order of a 100-fold or more. As a result, the contaminant should travel along both sets of joints, though admitedly somewhat faster in the more permeable joint set.

The complex hydrogeologic conditions at the site make it very difficult to quantify the exact pathway a contaminant may take. Uncertainty also surrounds whether the same fractures seen at the surface extend to the water table without interruption or if they are laterally extensive enough to carry contaminants to a nearby monitoring well. No information is available on the amount of dissolution or secondary mineralization of these fractures which can alter their permeability. Due to these and other uncertainties involved, several equally valid but unascertainable arguments could be made for potential contaminant pathways and corresponding monitoring well locations.

Nevertheless, after consultation with the USGS we believe that your argument for an eastern location has some merit, particularly after consideration of the Long Trail Shale which forms a basal no-flow boundary to the local ground water flow system. All things being equally uncertain, the high permeability contrast between this formation ($<10^{-7}$ cm/sec) and the overlying limestone ($\approx 10^{-4}$ cm/sec), and the shale's easterly dip should direct both ground water and contaminants in an easterly direction.

We have also reviewed Dames & Moore's submittal of August 10, 1992, wherein the proposed easterly location for the new well, MW-19, was provided. We find this proposed location acceptable; consequently, this letter constitutes approval of said location, contingent upon the following conditions:

1. Well Location - Barrick will locate well MW-19 at approximately North 27,675 feet and East 21,260 feet, local Barrick coordinates.

2. Well Construction - Barrick will construct the well in accordance with all EPA RCRA requirements outlined in Part I.H.4(a) of the permit.

3. Completion of Installation - Barrick will install well MW-19 and make it operational on or before October 1, 1992.

4. Submittal of "As-Built" Report - pursuant to Part I.H.4(b) of the permit, Barrick will submit a complete "As-Built" report on or before November 1, 1992.

5. Accelerated Background Ground Water Quality Sampling - as required of the other monitoring wells at Dump Leach No. 3, Barrick will complete a one year period of bi-weekly ground water sampling of MW-19 in compliance with Part I.H.5 of the permit. At the conclusion of the one year of sampling, Barrick will submit the required summary report on or before November 1, 1993.

Upon completion of all these requirements and final approval from the Executive Secretary, Barrick shall have satisfied all the outstanding conditions of the December 18, 1990 Conditional Approval.

If you have any questions or comments, please call Loren Morton at 538-6146. We appreciate your cooperation in this matter.

Sincerely,

Utah Water Quality Board

for Don A. Ostler, P.E.
Executive Secretary

DAO:LBM:lm

cc: Geoff Freethey, USGS-WRD, SLC
J.B. Brown, Dames & Moore, SLC
Wayne Hedberg, DOGM
Myron Bateman, Tooele Co. Health Dept.

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